

# Water Level Management Update

## Planning and Implementing a Second Year Drawdown in Pool 5

### Inside this Issue:

- Learning from the 2005 drawdown.
- A summary of monitoring results for the plant response, mussels, commercial navigation management, and impacts on recreation and much more.
- Recreational access information for 2006.
- Update on the island construction for 2006.

In 2005, a second year drawdown in Pool 5 was recommended in the Pool 5 Drawdown Letter Report/Environmental Assessment. This recommendation was presented to the public in the drawdown public meetings, and endorsed by the Water Level Management Task Force (WLMTF) and the River Resources Forum (RRF).

With the summer of 2006 rapidly approaching, plans for implementing a 2006 drawdown in Pool 5 are in full swing. As **currently** envisioned, the "parameters" of the proposed drawdown are similar to 2005:

- Maximum drawdown of 1.5-foot at LD 5.
- Maximum drawdown of 1.0-

foot at the primary control point (Alma gauge).

- Drawdown to begin on approximately June 12, 2006, and to end on approximately September 30, 2006.
- Rate of drawdown to be approximately 0.2-foot per day.
- Follow-up monitoring for main channel conditions, recreational access, mussels, and vegetative response will be conducted.

The above parameters are not "set in stone". Lessons learned from the 2005 drawdown, as well as public, agency and stakeholder input received this spring, will determine what the drawdown ultimately looks like in 2006.

Surveys of the main channel and recreational access points will be conducted in May, and will indicate if a 1.5-foot drawdown at the dam is feasible from a navigation and recreation access standpoint. Ongoing evaluation of mussel monitoring results, and accompanying recommendations by the mussel specialists supporting the project team, may affect the depth of drawdown and/or the rate of drawdown, and also could impact the start date. And, as always, we will need the river to cooperate by providing the proper range of river flows.

The parameters of the drawdown will be established by late May, and will be announced to the public via the media.

*Public Meetings are scheduled for :*

**Cochrane City /Fountain City High School**  
**Tuesday, April 18.**  
**6:30-8:30 p.m.**

**Wabasha/Kellogg High School**  
**Wednesday, April 19**  
**6:30- 8:30 p.m.**

## Public Meetings Scheduled for April to Present Plans for 2006

The U.S. Army Corps of Engineers, St. Paul District, will host two public meetings in April to solicit public opinion regarding the proposed 1.5-foot drawdown (water level reduction) of Pool 5 of the Upper Mississippi River this summer.

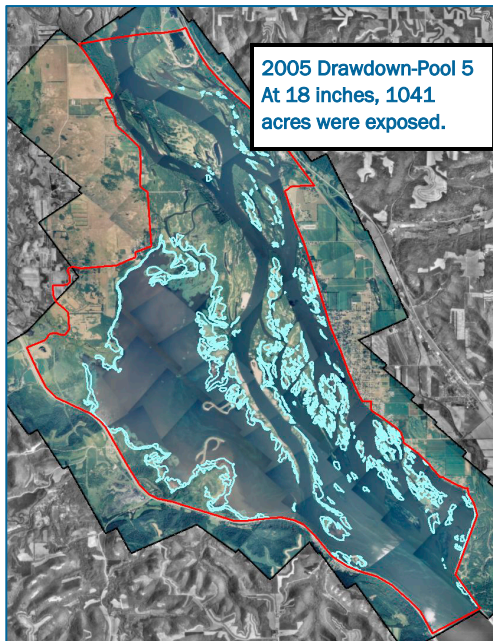
The first meeting will be held Tuesday, April 18 at the Cochrane/Fountain City High

School, located at S2770 State Highway 35, Fountain City, Wis. The second meeting will be held Wednesday, April 19 at the Wabasha/Kellogg High School, at 2113 Hiawatha Dr. E., Wabasha, Minn. Both meetings will be from 6:30-8:30 p.m.

The meetings will begin with an open house, followed by a for-

mal presentation at 7 p.m. There will be time for questions, answers and discussion after the presentation. Federal and state agency representatives will be available to discuss the plan under consideration, and to take public comments.

## A Quick Review of the 2005 Drawdown



Light blue signifies the area exposed at an 18 inch drawdown at L&D 5.

The following information may be helpful as you evaluate the proposed parameters for the 2006 drawdown and review the preliminary monitoring results.

- The drawdown began on June 13, 2005. The pool was lowered gradually until the target drawdown depth of 1.5-foot at LD 5 was achieved on June 29, 2005.
- In June and for most of July, river flows were higher than normal, so the 1.5-foot at LD 5 was maintained until about July 25.
- The drawdown exposed over 1040 acres of mudflats
- In late July and through September, low flows in the river necessitated an increase in the water level at Lock and Dam 5, resulting in a maximum drawdown of 1.0-foot at the Alma gage.
- Consequently some areas in the lower portion of the pool that had been exposed in mid July were reflooded, while other areas in the upper pool were exposed.
- The pool elevation in Pool 5 was raised starting on September 15, and Pool 5 was in normal pool regulation by September 30, 2005.

## Learning from the 2005 Drawdown in Pool 5



Pool-scale drawdowns for habitat restoration are a relatively new river management action on the Upper Mississippi River System. Because of this, much can be

learned from each drawdown through a well-designed monitoring program. This new knowledge can be used to adjust plans for future drawdowns to achieve more environmental benefit and minimize any adverse impacts. The scientific term for this is “adaptive management”, or “learning by doing”, and it is a key guiding principle in river ecosystem management.

Like the Pool 8 drawdowns in 2001 and 2002, the Pool 5 drawdown in 2005 provided a great opportunity to learn. The lessons learned are being applied to plans for a 2006 drawdown in Pool 5. A few of the key lessons learned, and the actions being considered to address those lessons, are:

Some concerns were expressed regarding commercial navigation through the main channel. To address this, a more extensive outreach to the shipping industry is planned for the Spring of 2006.

Some concerns were expressed regarding recreational access, including marking of the access channels. In 2006, extra effort will be made to clearly mark the usable recrea-

tional access channels.

Mussel mortality was observed. To mitigate this impact in 2006, several techniques are being considered, including a mussel “rescue”, drawing the pool down more slowly, e.g. at a rate of 0.1-foot per day, or reducing the drawdown to 1.0-foot.

These lessons learned, and the proposed actions to address them, will be considered by agency partners, and will be presented to the public in April 2006. All feedback will be considered as we “adapt” our plans for the 2006 drawdown in Pool 5, with the goal of having an even more successful drawdown this year.

## Monitoring the Changes

### Plant Response

Scientists are still in the process of evaluating the vegetation response to the pool-wide drawdown; however some preliminary results are available.

**Emergent vegetation sampling on exposed areas**—Scientists monitored the plant response on exposed mudflats by sampling a random set of 166 sites. Seventy two plant species were identified on the exposed substrates. The most frequently observed species were rice cutgrass, common arrowhead, sandbar willow, water stargrass, and chufa flatsedge. Growth progressed well despite the increase in water levels in late July in the lower portion of the pool.

Plant density was related to the amount of time the mudflats were exposed as well as the elevation above water surface and the reduction in soil moisture level. Generally the submersed species (water stargrass and Canada waterweed) were observed on sites dewatered for short periods. Arrowhead was most commonly observed on slightly elevated sites, with bulrushes and rice cutgrass also recorded on sites exposed for longer duration (i.e., 45 days). Species considered more terrestrial (e.g., willows and flatsedges) were most prevalent among the list of most common species and were observed on sites dewatered longer than 50 days.

**Submersed vegetation sampling** – The abundance of submersed aquatic vegetation in Pool 5 was also determined through sampling a set of 400 locations in August 2005. The relative frequency of occurrence of submersed aquatic vegetation during the 2005 drawdown was compared to that during the period 1999–2004. An increase in submersed aquatic vegetation in Weaver Bottoms (a large backwater lake) was observed during summer 2005 whereas the relative frequency of submersed aquatic vegetation in the other Pool 5 study areas was not different than what was observed in previous years. Although enhancing the growth of submersed aquatics was not a primary goal of the drawdown, these plants were monitored in order to obtain a more comprehensive understanding of drawdown effects.

### Mussels

River biologists investigated the effects of the Pool 5 drawdown on shallow water mussels. Experimental plots were established in Pools 4 (control) and 5. Marked mussels were used to compare survival during the drawdown along sloping shorelines and in shallow flats. Mussels were also sampled along transects in dewatered areas of Pool 5 and a poolwide visual survey was conducted to estimate mortality. Some of the conclusions of the study are as follows:

- The number of aerially exposed mussels and resulting mortality were higher than anticipated during the drawdown.
- Survival of mussels in the experimental plots was higher in the control pool (Pool 4) than Pool 5 for all stations, water depths, and slopes. Overall, survival was 100% in Pool 4 compared to 72% in Pool 5. However, within Pool 5 survival varied among depths and slopes. In Pool 5, 30% of the mussels placed in one foot water depth survived, whereas 88% and 98% survived when placed in two and three feet of water, respectively.
- Mortality of mussels in Pool 5 was three times higher in shallow flats than areas that sloped from shallow to deep water, suggesting that escape routes are important. Mussels seemed to sense lowering water levels and those on sloping areas usually escaped to deeper water. On large flat sites, mussels were more likely to move in random directions and were unable to escape to deeper water.
- More freshly dead mussels were found along side channels and backwaters than along the main navigation channel border.
- Mussels exposed or partially exposed to the air were subject to lethal temperatures for an extended time period. This suggests that high temperatures contributed to observed mussel mortality.
- Survival by species was variable. Some mussels have the ability to close their valves tightly sealing in water whereas other species have a noticeable gape, which exposes tissues to water loss.
- We found 26 species of mussels in the pool, which included a couple of species not previously known to occur in Pool 5, several state threatened and endangered species, and one federal candidate. Threeridge, Wabash pigtoe, threehorn wartyback, plain pocketbook and fragile papershell mussels accounted for 72% of the mussels collected during sampling, no state listed species were collected in samples and it's unknown how many state listed species died because of the drawdown.
- Mortality of mussels in transects ranged from zero to three per square meter. However, the total number of mussels that died as a result of the drawdown cannot be reliably estimated due to the limited scope of the study. We also do not have a population estimate for mussels in the pool for comparison.

Conclusions from this study are being used to implement measures to minimize the effects of the 2006 drawdown on the mussel population. Additional monitoring of mussels during the 2006 drawdown is planned. A drawdown in 2006 is expected to cause less mortality to mussels

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than in 2005 because mussels are probably not likely to re-colonize the dewatered area in the short time frame between drawdowns. Some of the methods or techniques being discussed to minimize the effects include:

- A focused mussel rescue in locations containing rarer species, high population densities, or high species richness of stranded mussels. Based on 2005 investigation, these locations will include at least three exposed gravel bars noticed last year in the pool.
- Reducing the rate and initiating the drawdown slightly earlier. An earlier starting date may help to reduce mussel colonization of the areas dewatered in 2005.
- Reducing the depth of the drawdown, as there was a significant relationship between water depth and survival.

#### **Shorebirds and Waterfowl**

Five shorebird surveys were conducted between late June and late September to determine the migratory shorebird use of new habitats created during the drawdown. Eighty four individual shorebirds were observed comprised of approximately 9 species. Preliminary review of survey data indicates waterfowl use of Pool 5 increased as compared to the five previous years.

#### **Recreation**

A recreational boating survey, including aerial photography from a series of 10 flights, was conducted for Pools 4, 5, and 5A during the summer of 2005. Data from 2005 was compared to recreational usage data collected during the period of 1989-2003. The survey concluded that, "...in general, recreational boating activity within the study area appears to be similar to the levels documented..." in previous surveys.

#### **Commercial Navigation**

The potential navigation impacts of the drawdown were coordinated extensively with the navigation industry through the River Resources Forum, the Water Level Management Task Force, the River Industry Action Committee, and the U.S. Coast Guard. Pilot surveys were conducted to get user input on the condition of the main channel. Preliminary conclusion from the surveys was that certain reaches of the pool were more difficult to navigate during drawdown conditions. However, none of the pilots' comments indicated that there were serious threats to the safety and security of crews, infrastructure and vessels.

During the drawdown, there were six groundings reported. None of the groundings were directly correlated as being caused by the drawdown, and the grounding reasons were similar to reasons for groundings during normal operations. The majority of the groundings were caused by tows out of the main channel. None of the groundings caused significant delays.

#### **Sediment Transport**

Considerable effort went into sediment monitoring and modeling in the main channel, and in Weaver Bottoms. Water flow was monitored to determine how the drawdown altered current patterns and the speed at which water was moving. Sediment was monitored to determine the effects of the drawdown on the movement of sand in the navigation channel, and the resuspension of fine sediments in backwater areas such as Weaver Bottoms. The following preliminary conclusions have been drawn:

- During the drawdown, a greater percentage of the total river flow was conveyed in the main channel, and main channel flow velocity increased. This potentially could cause increased bed sediment transport in the main channel.
- Hydraulic model results indicate that, during and after a drawdown, over-dredge cuts will fill in faster, leaving minimal advantages in following years; however, this is partially offset by increased scour at the downstream end of the dredge cut. Channel surveys in 2006 will tell us whether the dredge cut scour balanced the filling, and whether channel maintenance costs are increased.
- In Weaver Bottoms, sediment concentration and resuspension did not increase during the drawdown. Sediment concentration decreased in late summer. The increase in submersed aquatic vegetation may have been one of the factors causing this.

#### **Pool Wide Water Quality Monitoring by Long Term Resource Monitoring Program**

There appeared to be no obvious effects from the drawdown on water quality parameters related to suspended solids, turbidity, chlorophyll-a and transparency. Weaver Bottoms tends to degrade water quality due to internal processes and the 2005 drawdown was no exception.

#### **Continuous WQ Monitoring of Weaver Bottoms**

Analysis of continuous monitoring data collected in Weaver Bottoms is not complete. However, based on an initial evaluation of the data the following observations can be provided.

- Very high dissolved oxygen concentrations (> 20 mg/L) and large fluctuations in dissolved oxygen between day and night hours were noted during early July during the period of maximum drawdown. This response occurred during the period of maximum water temperatures (greater than 86F) which likely contributed to increased photosynthetic activity.

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## Boating Access During the Drawdown

The challenge of providing adequate recreational boating access to the main river channel during a drawdown has been an ongoing concern for the Water Level Management Task Force; consequently some mid course adjustments are being discussed for the 2006 drawdown.

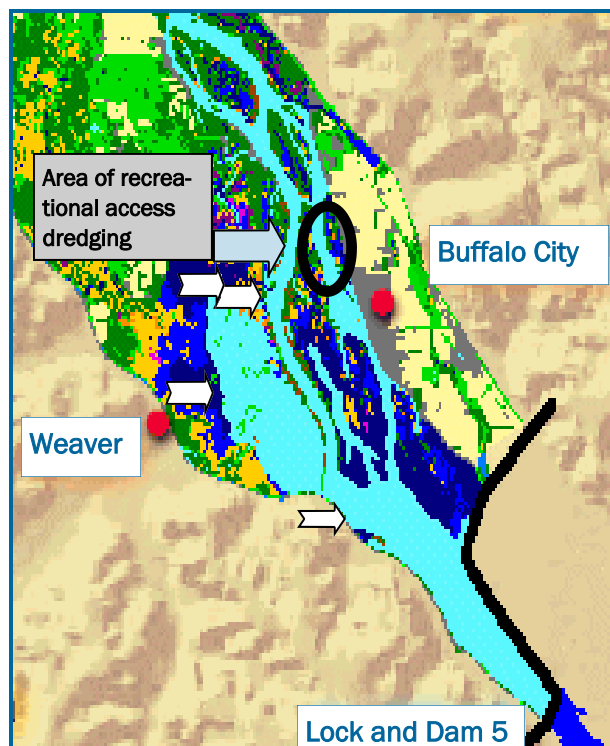
The West Newton access will remain open, and plans are being considered to make this a more permanent access. A small amount of dredging may be needed at this site. This access is located above West Newton Chute Dredged Material Disposal Site at approximately River Mile 749.8 along the Minnesota bank.

The Minneiska access was improved last summer by dredging out one of the culverts under Highway 61. Plans are to keep the access open for smaller boats during a drawdown; however, this will be contingent upon dredging the channel from

the railroad side of the culvert to the main channel. We will also be considering widening and deepening some of the recreational access cuts that were dredged last year, including two locations in Belvidere Slough, but there have been no commitments to do so.

Similar to last year, boat access channels that will probably be non-usable or restricted to smaller low drafting vessels in Minnesota include Weaver Bottoms Landing, Goose Lake Landing, and Halfmoon Landing. In Wisconsin, four of the five boat access points should not be significantly impacted. **The upper Spring Lake Landing which was closed due to construction will be open this summer.**

The goal is to provide at least as much if not more opportunity for recreational access than during the drawdown last year.



The white arrows indicate Locations of boat ramps which will be non-usable or restricted during the drawdown.

## Island Building Projects Near Completion

Two multi-agency, multi-million dollar habitat projects on Pool 5 are nearing completion. The first is the \$3.3 million island building project on Spring Lake that's part of the federal Environmental Management Program (EMP). The second project is the building of islands near the main channel using materials dredged from the main channel as part of the Corps' channel maintenance program.

The construction phase of the Spring Lake Islands which began in November 2004 is almost finished. In November contractors finished dredging in the upper part of Spring Lake to obtain topsoil for the islands, dredging that will in turn create

winter habitat for bass, bluegill and other backwater species. Some remaining rock work, the final shaping of the islands and seeding will be completed this spring prior to the start of the drawdown. Shrubs and trees will be planted after the grasses become established; probably in fall of 2007. The second island building project will also be shaped this spring and seeded.

The cumulative benefits of these projects in combination with the drawdown are important next steps toward restoring this stretch of the Mississippi River. The hope is that the combination of the drawdown and island-building will lead to bet-

ter habitat and better fishing, along with more abundant and diverse wildlife for hunters and wildlife watchers, similar to what existed several decades ago.

Bill Bruegger, Mayor of Buffalo City believes fishing and waterfowl hunting have already begun to improve as a result of the drawdown and will only get better when the Spring Lake project is completed, "I just hope Mother Nature will cooperate and let us do another drawdown this summer," said Bruegger. "Last year was a success and this next drawdown is the frosting on the cake!"

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- Highest total suspended solid (TSS) concentrations (turbidity) generally occurred during periods of highest wind speed although the actual correlation between TSS and wind speed was low. Daily average wind speeds were usually less than 10 mph with only one day exceeding 15 mph. Correlation between average daily wind speed and total suspended solid concentrations were hampered by inconsistent and variable sampling intervals.
- A marked increased in light penetration was noted in September and occurred during a period of very low TSS concentrations. Gross sedimentation rates declined during August and very low rates were measured during September. Sedimentation rates in September were 50-90% lower than similar measurements made in upper Weaver Bottoms in September 1993 and 1994. The mechanism for this response was not specifically determined but was likely influenced by increased aquatic plant growth (reduced sediment resuspension) in the vicinity of the monitoring site and low phytoplankton concentrations.

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